

the "Euichthyes," which include Plagiostomes, Teleostomes, and Dipnoi. The order of Ganoidei is still allowed to survive, and Polypterus reposes beside Lepidosteus and Amia. In the treatment of Reptiles a recognition of the phylogenetic relations is practically missed by insufficient notice of the extinct classes, and Archæopteryx (der zwar kein wirklicher Vogel war) is discussed under Reptiles rather than under Birds. Placental mammals are dealt with in four groups:—Unguiculata (the Rodents come somewhat quaintly between Chiroptera and Edentates), Ungulata, Natantia (Sirenia beside Cetacea), and Primates. The strongest part of the volume seems to us to be the general discussion of the structure of Vertebrata, but even here the author's extraordinary restraint lessens the interest of many of his paragraphs; we may refer, for instance, to what he says in regard to the thyroid and the thymus.

The figures have been designedly kept simple, but they are very clear and accurate. They are for the most part from original drawings, and many of them are fresh and interesting.

OUR BOOK SHELF.

The Analysis of Oils and Allied Substances. By A. C. Wright, M.A., B.Sc. Pp. xi + 241. (London: Crosby Lockwood and Son, 1903.) Price 9s. net.

THE book is not, nor does it profess to be, a manual for the oil specialist. As a work for the student who wishes to specialise and "as a laboratory guide for chemists who are not extensively engaged in oil analysis, or who have to deal with only a limited number of oils" (to use the words of the preface), it fills a decided want, and is evidently written by one who understands the requirements in such a case. The first chapter, on the occurrence and composition of oils, fats and waxes, may at first sight appear to be superfluous, but it deals systematically with so many substances that are unfamiliar to those relying only on the usual chemical textbooks for their knowledge that it forms a really essential introduction to the subsequent chapters.

In the section on glycerin, a table of specific gravities of glycerin of different strengths is given; an error exists here in the specific gravity of 40 per cent. glycerin, 1.020 being evidently a misprint for 1.1020.

The chapter on the chemical properties of oils, fats and waxes from the analytical standpoint includes careful descriptions of the methods of obtaining the so-called constants; the "ether value" is called the "ester value"—a preferable term. An important comparison is given of Hübl's and Wijs's methods of determining iodine values.

A chapter which contains a somewhat extended description of the properties of the more important oils, &c., with the methods of their investigation, is one which is of especial use to those taking up the study of this subject, but it is doubtful how far the author is justified in saying a little, in a book of this character, on such a debated question as the estimation of beef-tallow in lard—one of the most difficult problems that the oil chemist can have put before him.

On the whole, the author appears to have succeeded in the task he has set himself, and the subject-matter is carefully brought up to date. References to original papers are numerous.

The book is very clearly printed, it is got up in very readable style, and the index appears to have been carefully compiled with a view to completeness.

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Opere di Galileo Ferraris. Vol. i. Pp. xxviii + 492. (Milan: Ulrico Hoepli, 1902.)

THE Italian Electrotechnical Association decided to commemorate its founder, Galileo Ferraris, by publishing his collected works in three volumes, of which the present contains those papers which have the most intimate bearing on electrotechnics. The first, a paper on the use of the compass for galvanometric measurements, was written while Ferraris was assistant lecturer at Turin under Prof. Codazza, the second being his thesis for the doctorate, on the propagation of electricity in homogeneous solids, a mathematical work based on methods similar to those employed by Kirchhoff. The invention of the telephone by Graham Bell, about the year 1877, attracted the attention of Ferraris, who was not slow to read a paper at the Turin Society of Engineers, and to find in the new instrument a means of testing Helmholtz's theorem, according to which the timbre of a sound does not depend on the phases of its components. Another paper is on the intensity of the currents in the telephone. His two elegant theorems on the distribution of constant currents, published in 1879, follow. The introduction of secondary generators or transformers, in 1884, paved the way for his classical memoirs on the Gaulard and Gibbs transformer, on the difference of phase and dissipation of energy in transformers, on some results of experiments with the Ganz transformer, invented by Zipernowsky, Déri, and Bláthy, and an interesting correspondence with Dr. Hopkinson. The alternating current motor forms the subject of the next two papers, and the volume concludes with his treatise on the geometry of vector fields, which was published after his death. This paper affords an example of the spirit in which Ferraris devoted himself to science. His successes as an applied electrician, so far from drawing him aside from theoretical work, seem to have stimulated him to advocate the pursuit of research for its scientific value. From the introductory sketch of his work by Prof. Guido Grassi, we quote the following words:—"Whoever, in scientific researches, always has applications in view never discovers any." Again, at the second conference on electric lighting, in referring to the patient workers that had established the conditions for resolving economically the problem of illumination, Ferraris remarked:—"These men never thought of applications, and it is for this reason that they discovered them; they performed the part most important for applications, they provided the applicable things."

A Text-book of Field Astronomy for Engineers. By G. C. Comstock. Pp. x + 202. (New York: Wiley and Sons; London: Chapman and Hall, Ltd., 1902.) Price 10s. 6d.

THIS text-book is designed for the considerable class of technical students who need to make practical applications of the methods of spherical astronomy, but cannot devote to the subject the time necessary for a course such as befits those who wish to study astronomy as a science. Teachers who have to undertake the instruction of such students will study with interest the course which Prof. Comstock has adopted after an experience extending over many years, more especially as no attempt is made to reduce the work to mere rule-of-thumb processes. The introductory chapters include the necessary formulæ for the solution of spherical triangles, hints on the orderly arrangement of computations, definitions of coordinates, and a short account of the various corrections to observed data. The methods of observation are classified as rough, approximate and precise according to the degree of accuracy required, and this excellent arrangement not only simplifies the task of the student, but indicates how time may often be saved by avoiding the more refined

processes when a comparatively rough result is sufficient for the purpose in view. Some of the processes described have not usually been introduced into elementary treatises, but all that are given have been found by the author to be well adapted for students. It is not quite clear why the description of instruments is postponed to the part dealing with accurate determinations, seeing that their use is assumed in earlier chapters, but otherwise the sequence is all that can be desired. Some of the "forms" for computation do not seem to be the best that could be devised for beginners, though they are doubtless well adapted to trained workers, and we think they could be made more self-explanatory with advantage to the student. The book deals very completely with the astronomical work involved in surveying, and anyone who masters its contents will obtain a thoroughly sound knowledge of the subject.

A New Student's Atlas of English History. By Emil Reich, Doctor Juris. Pp. vii+55 maps. (London: Macmillan and Co., Ltd.) Price 10s. 6d.

THIS small and handy atlas will be found of use in the higher forms of schools, for the modern specialising sixth form boy who is going to add to the number of open scholarships which his school can advertise to the world, more especially. Nor will the aspirant after a "first in modern history" find Dr. Reich's book of small use to him by any means. It contains many points that will not be found elsewhere; for instance, the historical summaries facing the maps in most cases will prove very handy. The maps themselves are good and are up-to-date; the latest partition of Africa is given, and the Transvaal and Orange Colony are as red as Natal. We may, perhaps, object to Egypt being described in brackets as "(Turkish)" on map 48; if it is not British, it is Egyptian; the shadowy and hardly even nominal overlordship of Turkey is hardly worth commemoration any longer. Also, there are not enough maps; what there are are so good that we should like more.

As is perhaps natural, however, in a German author, there is a suspicion of pedantry about the book. In the preface there is much talk about "pædagog" (though "pedagogue" in English is a term of abuse, and the Greek *παιδαγωγός* was a sort of male nursemaid!), and it is obviously directed rather to the address of the schoolmaster than of his pupil. Personally, we think that such a preface should be written for the information of the boy who is going to read the book. But this is a matter of opinion.

The Rational Memory. By W. H. Groves. Pp. vi+115. (Gloucester, Va.: W. H. Groves, n.d.)

Few could read this useful little book of 115 pages without benefit. The author does not claim originality, but has selected the principles and facts of recognised importance from other works on memory. The author draws special attention to the fact that one man may have a good memory for certain things, and yet be very deficient in remembering others. This fact, though so well known, is constantly overlooked by writers on memory. They can themselves remember, through the possession of some well-developed faculty, and therefore invent a system based on this fact, whereas the majority of persons might find greater difficulty in remembering through the system than through the ordinary method. The author devotes four chapters to the consideration of concentration and observation. There is a very instructive chapter on the necessity of reviewing the knowledge we possess, so as to have it available at any given moment. As we remember entirely from single impressions, it is of the greatest practical importance that when we receive

a new impression the previous one be revived. A simple illustration will make this clear: A man may meet another three separate times without remembering that he has met him before; he might subsequently remember that he had met the man on any one of the three occasions, but the remembrance would not be nearly so vivid as if he had recognised his acquaintance each time they met. The chapter on the subconscious or subjective memory contains many statements which will not admit of proof. As a matter of fact, all memory is subconscious; everything is remembered, and may, in favourable circumstances, be brought before the mind. There are some curious errors which the author would do well to correct in another edition, such, for instance, as the use of the word "mneumonics," which occurs repeatedly for "mnemonics," and the reference to Mr. Gladstone as Sir Wm. Gladstone.

Real Things in Nature. A Reading Book of Science for American Boys and Girls. By Edward S. Holden, Sc.D., LL.D., Librarian of the U.S. Military Academy, West Point. Pp. xxxviii + 443. (New York: The Macmillan Company, 1903.) Price 3s. 6d.

THE subtitle of this book is somewhat misleading, because it may give the idea that Dr. Holden imagines it is possible to teach science by reading lessons alone. An examination of the contents of the volume shows this is by no means the case, for Dr. Holden continually instructs his reader to try experiments bearing upon the statements made in the book. The scope of the volume is very wide, readings being given in astronomy, the various branches of physics, meteorology, chemistry, geology, zoology, botany, human physiology, and the numerous subjects included under the early history of mankind. The book is well and profusely illustrated; it contains a full table of contents, but no index, an omission which rather interferes with the usefulness of the book as a work of reference for pupils.

Castology: a View of the Oolite Period and Earliest Man. By J. Craven Thomas. Pp. 20. (Bromley: Kentish District Times Co., Ltd.)

THIS purports to be a paper read before "The Bromley Naturalist (*sic*) Society" in November, 1902, and we can only marvel. Had it been written two or three hundred years ago we should not have been surprised, but for anyone in the twentieth century to advance seriously the views expressed by Mr. Craven Thomas is astounding. His "science of castology" appears to be the contemplation (we cannot say study) of flint-casts which he regards as belonging to the Oolite period! But it will be sufficient to quote one paragraph from his pamphlet:—"Fossil flint is that which is composed of petrified organisms, with or without a certain amount of integument, such as leaves, branches of trees, fruit, birds, beasts, fishes, and broken parts of man"!!

The New Forest. Its Traditions, Inhabitants, and Customs. By Rose C. de Crespigny and Horace Hutchinson. Pp. viii + 293. (London: John Murray, 1903.) Price 2s. 6d. net.

THIS pleasantly written book appeals both to lovers of the New Forest and to those who have yet to make the acquaintance of this vast woodland region. Readers who have themselves explored the recesses and solitudes of the forest will be impressed by the wide knowledge of the beauties of this part of Hampshire possessed by the authors; and those who have not yet strolled through the leafy glades of, say, Mark Ash will, after reading the book, be anxious to spend a few pleasant days wandering in the forest.